

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY


(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference 3455.1000003	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA416
International application No. PCT/US2004/019187	International filing date (day/month/year) 16.06.2004	Priority date (day/month/year) 20.06.2003	
International Patent Classification (IPC) or national classification and IPC B29C47/00, B29C47/76			
Applicant BATTENFELD GLOUCESTER ENGINEERING CO., INC.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 7 sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  24.01.2005		Date of completion of this report  06.10.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer  Jensen, K  Telephone No. +31 70 340-3433	



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/US2004/019187

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-31 as originally filed

**Claims, Numbers**

1-49 filed with the demand

**Drawings, Sheets**

1/3-3/3 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
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International application No.  
PCT/US2004/019187

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	
	No: Claims	1-49
Inventive step (IS)	Yes: Claims	
	No: Claims	1-49
Industrial applicability (IA)	Yes: Claims	1-49
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

1. The following document is referred to in this communication:

D1: US-A-3 597 850 (JENKINS JOHN W) 10 August 1971 (1971-08-10)

D2: US-A-5 204 032 (RIFI MAHMOUD R ET AL) 20 April 1993 (1993-04-20)

2. Under reference to item VIII, 1.5 it is assumed that the applicant has tried to define the matter for which protection is sought in the first independent claim, which for the benefit of the procedure will be considered in respect of Article 33 PCT herein below.

2.1 In this stage of the procedure document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and insofar as this claim can be understood. Unclear features are underlined and the interpretations are in parentheses(...).

A process for (reducing) substantially eliminating the occurrence of surface aberrations during extrusion of a thermoplastic polymer, comprising:

- (a) providing a thermoplastic polymer resin that has been treated by the application of heat (to reduce) in an atmosphere for a period of time sufficient to remove low molecular weight components, including organic compounds; whereby the thermoplastic polymer resin does not comprise processing aid; and
- (b) extruding the heat treated and processing free thermoplastic polymer resin through a die wherein the extrusion conditions are such that the process would otherwise produce surface aberrations if the polymer resin were not treated to remove low molecular weight components in the absence of processing aid, thereby producing an extruded thermoplastic polymer product in which surface aberrations are substantially eliminated;

wherein the thermoplastic polymer resin and the resulting extruded thermoplastic polymer are (not) substantially free of processing aid, cf. document D1, column 2, lines 64 - 74 and figure 1.

Although "organic compounds" is not explicitly disclosed in D1 as being removed from the material, it is considered to be implicitly disclosed as organic solvents have boiling temperatures lower than that of water and therefore is also removed from the material with the water vapour. Additionally having a "processing aid free" material is considered as disclosed in D1 as it nowhere mentions the need of additives.

Therefore the subject matter of claim 1 is deprived of novelty and claim 1 does not fulfill the requirements of Article 33(2) PCT.

- 2.2 Due to the reasoning of item VIII and V, 2.1, the novelty of the respective subject-matter of independent claims 20, 23, 27, 30, 32, 36, 45, 46 cannot be confirmed in this report and claims 20, 23, 27, 30, 32, 36, 45, 46 do not meet the requirements of Article 33(2) PCT.
3. The argumentation of item V, 2 and VIII lead to a situation, wherein the novelty or the presence of inventive step regarding the subject matter of dependent claims 2-19, 21, 22, 24-26, 28, 29, 31, 33-35, 37-44, 47-49 cannot be confirmed, further reference is made to the search report.

Consequently the requirements of Article 33(3) PCT are not met by these claims.

4. The claims relate to subject-matter that fulfills the requirements of Article 34(4) PCT with respect to industrial applicability.

#### **Re Item VII**

#### **Certain defects in the international application**

1. The independent claims are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate.
2. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

**Re Item VIII**

**Certain observations on the international application**

1. In respect of the requirements of Article 6 PCT, the following is observed.
  - 1.1 In accordance with the PCT-Guidelines 5.23 a process for is herein interpreted as a process suitable therefor.
  - 1.2 It is to be mentioned that the term "substantially" throws doubt on to the exact meaning of meaning of the expression "substantially eliminating the occurrence of surface aberrations", cf. PCT-Guidelines, 5.38; it is not clear to what extent the surface aberrations are "eliminated". "Substantially" is repeatedly used throughout the claims and description, for which reason similar deficiencies are considered to be present in other parts of the claimed matter. Consequently claims 1 - 49 do not comply with Article 6 PCT.
  - 1.3 Claim 1 further lacks clarity as it refers to process steps (a) and (b) where (a) states "providing a thermoplastic polymer resin that has been treated by the application of heat in an atmosphere for a period of time sufficient to remove low molecular weight components...", this sentence is considered to contravene the PCT Guidelines, section 5.35 as it describes the process step as a result to be achieved, without providing the technical features necessary for achieving this result.

Process step (b) states "...through a die wherein the extrusion conditions are such that the process would otherwise produce surface aberrations if the polymer resin were not treated to remove low molecular weight...", but does not teach the skilled man which are the conditions. It describes only, as in step (a), the result to be achieved by certain conditions, which contravenes PCT-Guidelines, 5.35.
  - 1.4 All the independent claims suffer from lack of clarity according to Art. 6 PCT, however detailed analysis as done for claim 1 would be to go beyond the scope of this report and many of the objections raised relative to claim 1 translates to the other independent claims.

- 1.5 Claims 1, 20, 23, 27, 30, 32, 36, 45 and 46 have been drafted as separate independent claims. At present it cannot be seen how such a list of independent claims can comply with the PCT-Guidelines 5.15 wherein it is stated that an independent claim which defines an invention should contain all the essential features of that invention. The various combinations of features contained by independent claims 1, 20, 23, 27, 30, 32, 36, 45 and 46 leads to the situation that formally the examining instance has to conclude that certain features cannot be essential for defining the matter for which protection is sought. In this respect further reference is made to Rules 6.4 and 13.1 PCT.
- 1.6 The term "about", used in dependent claims 10 and 11, prevent the subject matter of these claims from being unambiguously distinguished from the prior art, cf. PCT-Guidelines, 5.38.
- 1.7 The applicants attention is drawn to the fact that claims 20, 27, 36 - 38 are product by process claims which according to PCT-Guidelines 5.26, only relates to the product and not by which process the product is obtained.
- 1.8 The vague and imprecise statement in the description on page 31, lines 8 - 11, implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them.

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## CLAIMS

We claim:

1. A process for substantially eliminating the occurrence of surface aberrations during extrusion of a thermoplastic polymer, comprising:
  - (a) providing a thermoplastic polymer resin that has been treated by the application of heat in an atmosphere for a period of time sufficient to remove low molecular weight components, including organic compounds; whereby the thermoplastic polymer resin does not comprise processing aid; and
  - (b) extruding the heat treated and processing aid free thermoplastic polymer resin through a die wherein the extrusion conditions are such that the process would otherwise produce surface aberrations if the polymer resin were not treated to remove low molecular weight components in the absence of processing aid, thereby producing an extruded thermoplastic polymer product in which surface aberrations are substantially eliminated;wherein the thermoplastic polymer resin and the resulting extruded thermoplastic polymer are substantially free of processing aid.
2. The process of Claim 1 wherein the thermoplastic polymer resin comprises a linear low density polyethylene.
3. The process of Claim 2 wherein the thermoplastic polymer resin comprises a solution phase linear low density polyethylene.
4. The process of Claim 1 wherein the treated thermoplastic polymer resin is substantially in the form of resin pellets.
5. The process of Claim 1 wherein step (b) is performed using a blown film extrusion process.



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6. The process of Claim 1 wherein step (b) is performed using a cast film extrusion process.
7. Cancelled.
- 5 8. The process of Claim 1 wherein the thermoplastic polymer resin has been treated by the application of heat in an atmosphere to remove substantially all low molecular weight components.
- 10 9. The process of Claim 1 wherein the thermoplastic polymer resin has been treated by the application of heat in an atmosphere to remove low molecular weight compounds to a degree sufficient to substantially eliminate microcellular foaming.
- 15 10. The process of Claim 1 wherein the thermoplastic polymer resin has been treated by heating at a temperature of at least about 130°F (about 54.4°C) for at least about 4 hours.
- 20 11. The process of Claim 1 wherein the thermoplastic polymer resin has been treated by heating at a temperature of about 140°F (about 60°C) to about 160°F (about 71.1°C) for about 4 hours to about 60 hours.
- 25 12. The process of Claim 1 wherein the thermoplastic polymer resin has been treated by heating to a temperature less than the melting point of the thermoplastic polymer resin.
- 30 13. The process of Claim 1 wherein the provided thermoplastic polymer resin has been treated within a vented extrusion apparatus prior to extrusion through the die.

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14. The process of Claim 1 wherein the treated thermoplastic polymer resin is extruded using an extrusion apparatus such that during extrusion, low molecular weight compounds are removed from the resin prior to the resin exiting the die.
- 5
15. The process of Claim 1 further comprising heating the thermoplastic polymer resin in an atmosphere sufficient to substantially eliminate the tendency to create surface aberrations.
- 10
16. The process of Claim 15 wherein the atmosphere is an at least partial vacuum.
17. The process of Claim 1 further comprising mixing the treated thermoplastic polymer resin prior to exit of the resin from the die.
- 15
18. The process of Claim 17 wherein the resin is mixed using an inline static mixer.
19. The process of Claim 17 wherein the thermoplastic polymer resin comprises low viscosity compounds and the concentration of the low viscosity compounds is substantially uniform throughout the thermoplastic polymer resin prior to exit of the resin from the die.
- 20
20. A thermoplastic polymer film produced by the process of Claim 1.
- 25
21. The thermoplastic polymer film of Claim 20 wherein the film comprises a linear low density polyethylene.
22. The thermoplastic polymer film of Claim 20 wherein the film is a multi-layer thermoplastic polymer film.
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23. A process for substantially eliminating surface aberrations during extrusion of a thermoplastic polymer, comprising extruding the thermoplastic polymer through a die wherein the thermoplastic polymer is substantially free of low molecular weight compounds, including organic compounds, and processing aid.
24. The process of Claim 23 wherein the thermoplastic polymer resin comprises a linear low density polyethylene.
25. The process of Claim 24 wherein the thermoplastic polymer resin comprises a solution phase linear low density polyethylene.
26. The process of Claim 23 wherein the thermoplastic polymer resin is substantially in the form of resin pellets.
27. A thermoplastic polymer film produced by the process of Claim 23.
28. The thermoplastic polymer film of Claim 27 wherein the film comprises a polymer selected from the group consisting of polyethylene, linear low density polyethylene, and combinations thereof.
29. The thermoplastic polymer film of Claim 27 wherein the film is a multi-layer film.
30. A process for producing a thermoplastic film, comprising:
- (a) polymerizing ethylene to produce linear low density polyethylene;
  - (b) treating the linear low density polyethylene by the application of heat in an atmosphere for a period of time sufficient to remove low molecular weight components, including organic compounds, whereby the thermoplastic polymer resin does not comprise processing aid; and

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5 (c) extruding the heat product of step (b) through a die to produce a thermoplastic film under extrusion conditions such that the process would otherwise produce surface aberrations if the polymer resin were not treated to remove low molecular weight components in the absence of processing aid;

wherein the thermoplastic film is substantially free of processing aid.

10 31. The process of Claim 30 further comprising pellenizing the linear low density polyethylene prior to treating the linear low density polyethylene by the application of heat.

15 32. A low density polyethylene extrusion resin for blown film extrusion, comprising polyethylene that is substantially free of low molecular weight species, including organic compounds, and substantially free of processing aid.

20 33. The low density polyethylene resin of Claim 32 wherein the resin is substantially free of a compound selected from the group consisting of ethylene, copolymerization monomer, polymers having carbon chains of less than about 12 carbon atoms in length, and water.

25 34. The low density polyethylene resin of Claim 33 wherein the resin is substantially free of ethylene, copolymerization monomers, polymers having carbon chains of less than about 12 carbon atoms in length, and water.

30 35. The low density polyethylene resin of Claim 32 wherein the resin comprises linear low density polyethylene.

36. A thermoplastic polymer resin wherein the resin has been treated by the application of heat in an atmosphere for a time sufficient to remove low molecular weight components, including organic compounds, to

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substantially eliminate the tendency to create surface aberrations during extrusion of the resin.

- 5 37. The thermoplastic polymer resin of Claim 36 wherein the resin has been treated following a polymerization step whereby the polymer resin is formed.
- 10 38. The thermoplastic polymer resin of Claim 37 wherein the resin has been treated following a pelletization step whereby the polymer resin is formed into pellets.
39. The thermoplastic polymer resin of Claim 36 in the form of pellets.
- 15 40. The thermoplastic polymer resin of Claim 36 wherein the thermoplastic polymer resin comprises linear low density polyethylene.
41. The thermoplastic polymer resin of Claim 36 wherein the application of heat in an atmosphere has removed substantially all low molecular weight compounds.
- 20 42. The thermoplastic polymer resin of Claim 36 wherein the resin is substantially free of a compound selected from the group consisting of ethylene, copolymerization monomer, polymers having carbon chains of less than about 12 carbon atoms in length, and water.
- 25 43. The thermoplastic polymer resin of Claim 36 wherein the resin is substantially free of processing aid.
- 30 44. The thermoplastic polymer resin of Claim 36 wherein the resin contains concentrations of low molecular weight species such that film extruded from said polymer will not have surface aberrations, as judged by the unaided eye, when extruded through a tubular film die having a 0.055 inch (about 1.4

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mm) die gap at 400°F (about 204°C) and 12 lbs/hr/inch of die circumference (about 2.14 kg/hr/cm of die circumference).

45. An extruded thermoplastic polymer film comprising a thermoplastic polymer resin wherein the extruded thermoplastic polymer film is substantially free of low molecular weight species, including organic compounds, substantially free of surface aberrations, and substantially free of processing aid.
46. A process for treating a thermoplastic polymer resin susceptible to surface melt fracture comprising heating the thermoplastic polymer resin for a period of time sufficient to remove low molecular weight components, including organic compounds, to substantially eliminate surface melt fracture upon subsequent extrusion under conditions which would otherwise produce surface melt fracture.
47. The process of Claim 46 wherein subsequent extrusion is through a tubular film die having a 0.055 inch (about 1.4 mm) die gap at 400°F (about 204°C) and a rate of 12 lbs/hr/inch of die circumference (about 2.14 kg/hr/cm of die circumference).
48. The process of Claim 46 wherein the thermoplastic polymer resin is heated to remove low molecular weight components.
49. The process of Claim 48 wherein the thermoplastic polymer resin is heated to a temperature less than the melting point of the thermoplastic polymer resin.